

Spot Safety Project Evaluation

Project Log # 200704307

Spot Safety Project # 05-99-005

**Spot Safety Project Evaluation of the Construction of a Center Left Turn Lane on
SR 2215 (Buffaloe Rd) from SR 2939 (Willow Creek) to Tallyhoe Drive
Wake County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Brad Robinson, EI

Traffic Safety Project Engineer

11/6/2007
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-99-005 – SR 2215 (Buffaloe Rd) from SR 2939 (Willow Creek) to Tallyhoe Drive in Wake County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the widening of SR 2215 to provide a continuous center left turn lane from SR 2939 to Tallyhoe Drive. SR 2215 (Buffaloe Rd) was a two-lane facility in the before period and has a speed limit of 45 mph.

In addition to the two intersections defining the limits, there are several other driveways along the strip. Ward's Grocery is a corner grocery store next to SR 2939 that has two driveways on SR 2215. Near Ward's Grocery on the opposite side of SR 2215 is Foxhall Village, a road that leads to several residential areas.

The final completion date for the improvements at the subject intersection was on July 1, 2002 with a total cost of \$185,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from April 1, 2002 to September 30, 2002. The before period consisted of reported crashes from August 1, 1997 through March 31, 2002 (4 years and 8 months) and the after period consisted of reported crashes from October 1, 2002 through May 31, 2007 (4 years and 8 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes on SR 2215 (Buffaloe Rd) from 150' southwest of SR 2215 (Willow Creek) to 150' northeast of Tallyhoe Dr, a distance of approximately 1500 feet.

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Rear-End crash types were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	69	19	-72.5
Total Severity Index	7.3	3.34	-54.2
Target Crashes	41	9	-78.0
Target Crash Severity Index	3.89	2.64	-32.1
Volume	11,000	11,000	N/A
<u>Crash Severity Summary</u>			
Fatal Crashes	2	0	-100.0
Class A Crashes	1	0	-100.0
Class B Crashes	10	3	-70.0
Class C Crashes	18	3	-83.3
PDO Crashes	38	13	-65.8

The naive before and after analysis at the treatment location resulted in a 73 percent decrease in Total Crashes, a 78 percent decrease in Target Crashes, and no change in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2005.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 73 percent decrease in Total Crashes and a 78 percent decrease in Target Crashes. The Total Severity Index decreased by 54 percent and the Target Crash Severity Index decreased by 32 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the above table and the *Collision Diagrams*, it is apparent that construction of the center left turn lane helped to reduce Rear-End Crashes on the roadway. In the before period there were large Rear-End Crash patterns related to left turning vehicles just before all four of the largest intersections in the strip. In the after period all of these patterns have been mostly eliminated.

There were 2 Fatal Crashes in the before period. Neither of them were related to Rear-End Crashes. One of the fatalities resulted from a vehicle crossing the center line and having a Head On Crash with an opposing vehicle (crash # 69). The other was a pedestrian crash, which resulted in the death of the pedestrian (crash #23).

In the before period there were two bicycle crashes and five pedestrian crashes, including the Fatal Crash mentioned above. All seven of these crashes resulted in injuries. In addition, all seven of these crashes occurred near Ward's Grocery and Foxhall Village. In the after period there was only one pedestrian crash and no bicycle crashes.

The calculated benefit to cost ratio for this project is 23.24 considering total crashes. The benefit to cost ratio considering only target crashes is 3.74. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 2215 from SR 2939 to Tallyhoe
 COUNTY: Wake
 FILE NO.: SS 05-99-005

BY: Brad Robinson
 DATE: 10/31/2007

DETAILED COST: TYPE IMPROVEMENT - Center Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$185,000	20	0.102	\$18,843
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$185,000	20	0.102	\$18,843
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$600
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$0
TOTAL ANNUAL COST=	\$19,443
TOTAL COST OF PROJECT=	\$185,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.67	3	0.64	28	6.00	38	8.14	\$487,752
AFTER	4.67	0	0.00	6	1.28	13	2.78	\$35,824

Annual Benefits from Crash Cost Savings \$451,927

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	\$432,485
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	23.24

TOTAL COST OF PROJECT	-	\$185,000	COMPREHENSIVE B/C RATIO	-	23.24
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BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 2215 from SR 2939 to Tallyhoe
COUNTY: Wake
FILE NO.: SS 05-99-005

BY: Brad Robinson
DATE: 10/31/2007
Target

DETAILED COST: TYPE IMPROVEMENT - Center Turn Lane

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COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

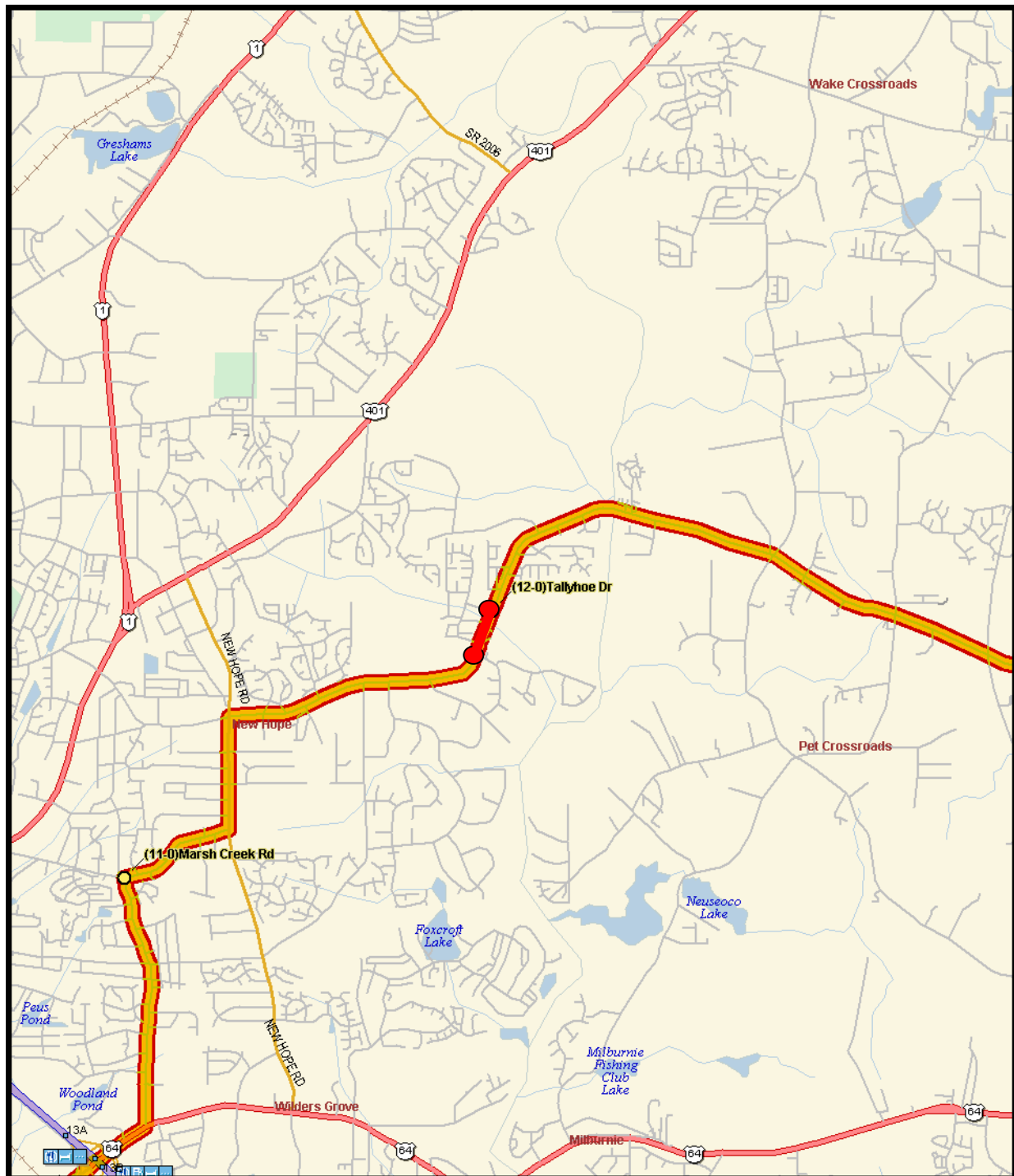
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.67	0	0.00	16	3.43	25	5.35	\$87,045
AFTER	4.67	0	0.00	2	0.43	7	1.50	\$14,283

Annual Benefits from Crash Cost Savings \$72,762

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	\$53,320
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	3.74

TOTAL COST OF PROJECT	-	\$185,000	COMPREHENSIVE B/C RATIO	-	3.74
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Location Map
Wake County
Evaluation of Spot Safety Project #05-99-005



Treatment Location: SR 2215 (Buffalo Rd) from SR 2939 (Willow Creek) to Tallyhoe

Treatment Site Photos Taken October 19, 2007



Driving Southwest on SR 2215 (Buffaloe Rd), Approaching Tallyhoe



Driving Southwest on SR 2215 (Buffaloe Rd)



Driving Southwest on SR 2215 (Buffaloe Rd), at Foxhall Village



Driving Southwest on SR 2215 (Buffaloe Rd), Approaching SR 2939 (Willow Creek)

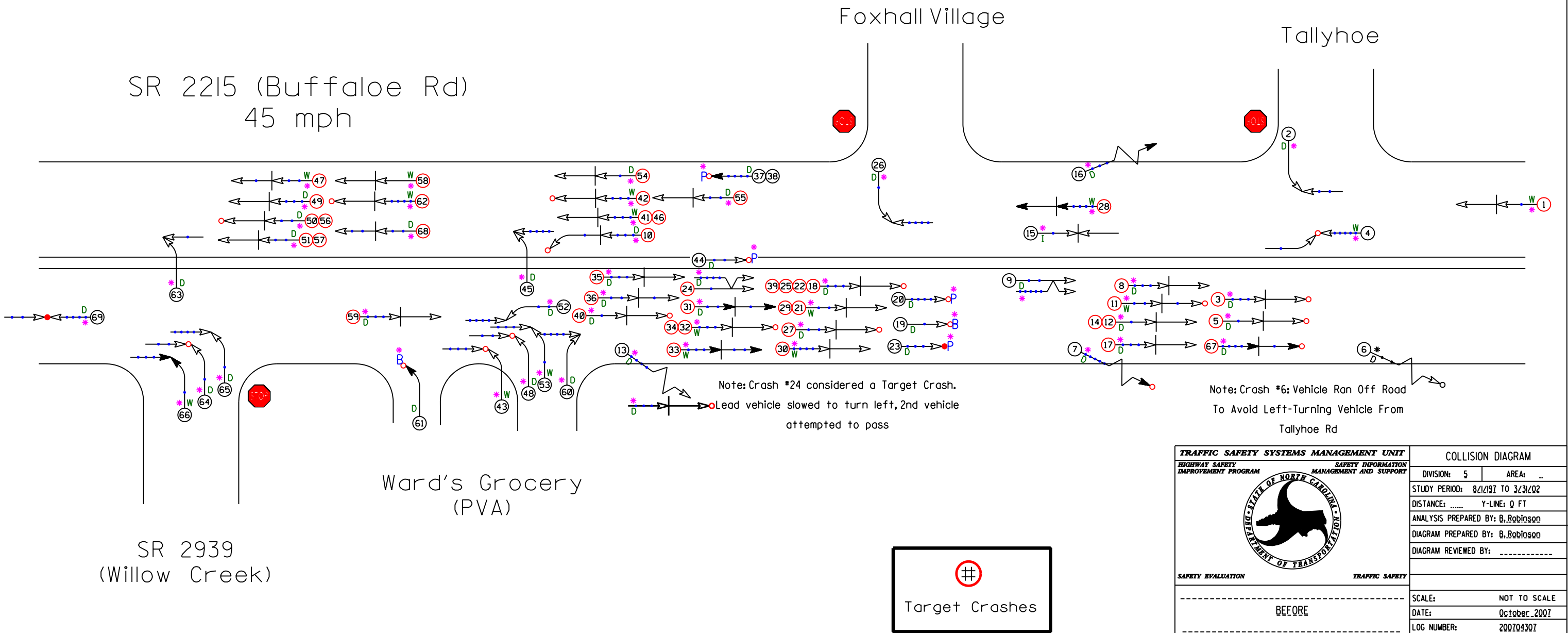



Driving Northeast on SR 2215 (Buffaloe Rd)

Wake County
SR 2215 (Buffaloe Rd) from SR 2939
(Willow Creek Rd) to Tallyhoe
Before Period: 8/1/1997-3/31/2002



LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		TURNING
	PARKED VEHICLE		BACKING
	PARKING VEHICLE		SIDESWIPE
	FIXED OBJECT		OUT OF CONTROL
	HEAD ON		INJURY
	REAR END		FATALITY
	RAN OFF ROAD		9 MPH OR LESS
			10 MPH TO 19
			20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
			70 AND UP
			SPEED UNKNOWN
			DAYLIGHT CRASH
			DARK CRASH
			P PEDESTRIAN
			B BICYCLE
			T TRAIN
			A ANIMAL
			• DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
	HIGHWAY SAFETY IMPROVEMENT PROGRAM	SAFETY INFORMATION MANAGEMENT AND SUPPORT	DIVISION: 5 AREA: ..
			STUDY PERIOD: 8/1/1997 TO 3/31/2002
			DISTANCE: Y-LINE: Q FT
			ANALYSIS PREPARED BY: B. Robinson
			DIAGRAM PREPARED BY: B. Robinson
SAFETY EVALUATION		TRAFFIC SAFETY	
----- BEFORE -----		SCALE: NOT TO SCALE	
		DATE: October 2007	
		LOG NUMBER: 200704307	
N.C. DEPARTMENT of TRANSPORTATION			
DIVISION of HIGHWAYS			
TRAFFIC ENGINEERING AND SAFETY			
SYSTEMS BRANCH			

